Stolen Fire: Why 200,000 Years of Human Evolution Ignited Only After Global Contact

Independent Observer — Volume II: The Political Empire

This paper is part of the **Independent Observer** series on political economy and global order. It functions as ***Volume II in the "Political Empire"*** strand, providing the historical and conceptual bridge between early industrialization, colonial extraction, and the contemporary architecture of data colonialism and platform power. Later volumes build on this argument to analyze how inherited asymmetries in knowledge, finance, and digital infrastructure shape today's institutions of global governance.

Abstract

Why did large-scale technological takeoff and the Industrial Revolution occur so late in human history, and why in Britain rather than in any of the older, highly sophisticated civilizations of Asia or the Middle East? This paper argues that the answer cannot be found in isolated "European genius" or endogenous superiority, but in a long civilizational relay in which knowledge, techniques, and institutions were progressively accumulated, displaced, and finally consolidated through global contact and imperial extraction.

Drawing on scholarship in global economic history, the history of science, and postcolonial theory, the paper reframes the so-called "***Great Divergence"*** as the outcome of three linked dynamics: (***1) the existence of deep knowledge reservoirs in non-European societies; (2) the violent and unequal incorporation of those reservoirs into European commercial and imperial networks; and (3) the eventual concentration of infrastructure, capital, and legal power in a small number of Atlantic states.*** The analysis traces how navigational science, mathematics, astronomy, agricultural and metallurgical techniques, and financial practices migrated across empires before being selectively rebranded as "European" innovation.

In the final section, the paper extends this framework to contemporary "data colonialism," arguing that undersea cables, platform infrastructures, and cross-border data extraction reproduce an updated form of the same relay: a global periphery that generates data, and a small core of firms and jurisdictions that monopolize computation, ownership, and strategic value. The historical argument is thus used to illuminate current struggles over digital sovereignty, infrastructural control, and the political economy of artificial intelligence.

Keywords: Knowledge transfer; Industrial Revolution; global history; data colonialism; intercultural exchange; imperial science; Big Tech; East–West integration; world-systems theory.

1. Introduction — The Puzzle of Sudden Modernity

Homo sapiens has existed for roughly 200,000 years, yet the transformation commonly labelled “modernity” is only a few centuries old. For most of human history, technological change was slow, local, and reversible. Stone tools endured for tens of thousands of years, agrarian empires rose and fell without changing basic production methods, and literacy remained confined to narrow elites. Then, between the seventeenth and nineteenth centuries, a dramatic discontinuity emerged: steam power, mechanized factories, global navigation, mass schooling, electrification, and, eventually, computation.^1 The abruptness of this shift raises a destabilizing but straightforward question: **why did the Industrial Revolution occur in Britain around 1750–1850, and not somewhere else, much earlier, in the long span of human existence?**

The conventional answer—especially in ***Euro-American textbooks—*** invokes European exceptionalism. It credits the ***“rise of the West”*** to an endogenous sequence of events: the Renaissance, the Reformation, the Enlightenment, the Scientific Revolution, and a supposedly unique European cultural disposition toward rationality, experimentation, and capitalism.^2 On this view, industrialization is the natural flowering of ***“Western civilization,”*** while Asia, Africa, and the Middle East are relegated to the role of passive recipients or late imitators.

Comparative research in global history, the history of science, and historical economics has made this narrative increasingly untenable. Joseph Needham’s monumental study of Chinese science documented sophisticated mechanical engineering, hydraulic systems, metallurgy, and statecraft in China centuries before anything comparable in Europe.^3 George Saliba’s work on Islamic astronomy showed that so-called “***European”*** breakthroughs in optics, trigonometry, and planetary modelling were built directly on earlier research undertaken in Baghdad, Damascus, and Samarkand.^4 Studies of Indian mathematics by Kim Plofker and others have traced the development of the place-value numeral system, zero, advanced trigonometric functions, and astronomical constants—all fundamental for modern engineering—to South Asian scholars long before they appeared in Europe.^5

Economic historians have reached parallel conclusions about material conditions. Andre Gunder Frank and Kenneth Pomeranz argue that until at least the eighteenth century, the financial core of the world economy lay in Asia, particularly China and India, not in Europe.^6 What changed was not

a sudden flowering of European genius, but Europe's increasing integration into, and eventual dominance over, a pre-existing Afro-Eurasian system through maritime expansion, colonization, and control of resource frontiers.^7 Once European states—especially Britain—secured privileged access to colonial labor, raw materials, and markets, they could mobilize the capital surplus and demographic base needed to apply imported scientific ideas on an industrial scale.

This paper builds on that body of work to advance a specific claim: **the Industrial Revolutions were not a spontaneous European miracle but the outcome of a "civilizational relay" in which Europe became the terminal assembler of knowledge produced across India, Persia, China, the Islamic world, and Africa.** The mathematical tools required for industrial engineering—algebra, logarithms, trigonometry, positional numerals—were not European inventions; they arrived through centuries of translation, trade, missionary activity, and ultimately imperial domination. ^8 Without those inputs, steam engines, precise mechanics, and the calculus of motion would have been mathematically impossible.

The timing of the Industrial Revolutions is thus explained not by an abstract, intrinsic European cultural transformation, but by a concrete historical process: **the moment when European polities gained sustained, extractive access to external reservoirs of knowledge, labor, and resources.** Britain did not industrialize in the twelfth or fourteenth century because it did not yet command the intellectual infrastructure, global extraction networks, or demographic reach that later underpinned industrialization. Only after large-scale colonial empires and maritime trade circuits were established did Europe obtain the informational and material conditions for rapid technological acceleration.

The same structural pattern, this paper suggests, is visible in the contemporary digital economy. Recent work on "***data colonialism***" argues that global technology corporations reproduce older imperial logics by concentrating control over the infrastructures through which human life is recorded, quantified, and monetised.^9 Transoceanic cables linking North America and Europe to India, Southeast Asia, and Africa, vast offshore data centers, and the offshoring of software and AI development to the Global South all suggest a familiar asymmetry: intellectual and computational labor are increasingly sourced from Eastern and Southern populations. At the same time, legal and financial control remains anchored in Western institutions.

The argument developed here is therefore twofold. First, at the historical level, it explains why industrialization appeared ***"late"*** in human history and ***"suddenly"*** in Britain: not because Europe discovered science in isolation, but because it became, through empire, the primary beneficiary

and integrator of a much older, global knowledge system. Second, at the analytical level, it frames technological acceleration as a function of **intercultural entanglement under unequal power conditions**, rather than as a rare cultural property of any single civilization.

This introductory reframing prepares the ground for ***Independent Observer — Volume II: The Political Empire*.** Suppose industrial modernity itself rests on inherited, extracted knowledge. In that case, the contemporary architecture of global governance—financial institutions, security alliances, standard-setting bodies, and platform monopolies—must be read as the political superstructure built atop that inherited foundation.

2. The Myth of Spontaneous European Innovation

Despite the popular narrative of a self-propelling “European miracle”, the historical record shows that Europe remained scientifically and technologically peripheral for most of human history. The idea that modernity emerged spontaneously from within Europe—untouched by outside influence—is not an empirical conclusion but a cultural construction. It was stabilized in the nineteenth and early twentieth centuries, when imperial powers required an intellectual framework to legitimize colonial rule and racial hierarchy. ^10 Modern research across comparative history, the history of science, mathematics, and global intellectual exchange consistently undermines this story.

2.1 Europe before the seventeenth century: a technological backwater

Before the seventeenth century, Europe lacked several foundational components necessary for sustained scientific progress.

First, it did not use a positional numeral system. Roman numerals remained standard in accounting, architecture, and administration well into the late medieval period. George Ifrah’s history of numeration emphasizes how arithmetically dysfunctional this system was: routine multiplication, division, and extraction of roots were laborious, error-prone, and practically unsuited to advanced algebra or engineering.^11 The Hindu-Arabic numeral system, including positional notation and the use of zero, entered European practice only gradually via Arabic intermediaries between the eleventh and fifteenth centuries, and met resistance from local authorities and guilds.^12

Second, European astronomy and mathematics lagged significantly behind developments in India, Persia, and the Islamic world. While medieval European scholars relied heavily on the geocentric Ptolemaic system, astronomers in the Islamic world had already refined trigonometric

functions, constructed sophisticated planetary models, and critiqued elements of Ptolemy's framework. ^13 Indian astronomers had, centuries earlier, produced accurate tables of sines and developed computational techniques that would later feed into Islamic and then European astronomy. ^14

Third, Europe's institutional landscape for scientific work was weak. Unlike China's imperial examination system and state-sponsored observatories, or the Islamic world's endowed madrasas and research complexes, pre-modern Europe lacked any large-scale, centralized infrastructure dedicated to scientific investigation. ^15 Knowledge was fragmented across monasteries and courtly patronage networks, with limited continuity and little systematic state support.

Fourth, European metallurgy and mechanical engineering also lagged their Asian counterparts. Chinese blast furnaces, hydraulic engineering, and mechanical clocks were more advanced than anything in contemporary Europe.^16 South Asian iron and steel production, including the famous wootz steel, was widely recognized for its quality and influenced weapon-making across Eurasia.^17 By contrast, European capacity to produce high-quality, standardized metal on a large scale remained limited until well into the early modern period.

These deficiencies were structural rather than incidental. Europe was geographically fragmented, frequently at war, and relatively poor in comparison to the great agrarian empires of Asia. It did not command the population density, agricultural surplus, or integrated trade networks necessary to sustain large, continuous scientific institutions. In world-systems terms, Europe was not the **"core"** but a semi-peripheral or even peripheral region until at least the seventeenth century. ^18

2.2 The invention of the European "Scientific Revolution."

For much of the twentieth century, the ***"Scientific Revolution"*** was portrayed as a uniquely European awakening—a sudden leap in rationality that set Europe apart from the rest of the world. The canonical sequence usually runs from Copernicus, through Kepler and Galileo, to Descartes and Newton. This narrative, however, systematically downplays the extent to which these figures relied on intellectual resources originating outside Europe.

George Saliba has demonstrated that Copernicus's use of trigonometric tools and some of his geometric constructions closely resemble earlier work done in the Maragha and Samarqand observatories in the Islamic world.^19 Kepler's astronomical calculations and planetary tables relied on computational techniques and parameters that had been

refined over centuries by non-European astronomers.^20 Newton's mechanics and calculus assumed algebraic notation, logarithms, and trigonometric functions that originated from earlier developments in India and the Islamic world.^21 As Arun Bala states, the so-called Scientific Revolution "can only be understood as the outcome of a dialogue of civilizations," not as a purely European invention.^22

Toby Huff has argued that specific legal and institutional configurations in Europe—such as corporate universities and some forms of urban autonomy—did create a distinctive environment for scientific debate. ^23 But even he acknowledges that European science drew extensively on translations of Greek, Arabic, and, indirectly, Indian texts. The key point for the present argument is not to deny European contributions, but to reject the fiction that they appeared in an intellectual vacuum.

2.3 Why the myth persisted

The resilience of the spontaneous-innovation myth owes more to politics than to evidence. During the height of European imperial expansion (c 1800–1950), it was ideologically convenient to portray the colonizing powers as bearers of a unique civilizational mission. A linear story in which the Greeks bequeath reason to Rome, which passes it to medieval Christendom, which then blossoms into Renaissance, Enlightenment, and industrial modernity, conveniently erases more than a millennium of non-European intellectual labor.

Three mechanisms sustained the myth:

- **Erasure**: contributions from Indian, Chinese, Islamic, and African scholars were deleted from standard histories of science or relegated to "prehistory" before the real story began.
- **Renaming**: terms like algebra (from *al-jabr*), algorithm (from al-Khwarizmi), azimuth, zenith, and even sine (from Sanskrit *jya* via Arabic *jiba*) were assimilated into European languages, obscuring their origins. ^24
- **Chronological compression**: European narratives jumped from ancient Greece to Renaissance Italy, glossing over the fact that Islamic scholars not only preserved but significantly expanded Greek mathematical, medical, and astronomical knowledge during the so-called "Dark Ages.".^25

Recent global histories have challenged these distortions. Needham's "Grand Question"—why China, with its apparent technological lead, did not industrialize first—has forced historians to reconsider the assumption that Europe's trajectory was inevitable or internally driven.^26 Pomeranz's analysis of the "Great Divergence" emphasizes ecological and colonial

contingencies rather than cultural superiority.^27 Frank's *Reorient* similarly relocates the center of the early modern world economy to Asia and shows how Europe's rise depended on tapping into that pre-existing system.^28

Taken together, this literature undermines the notion of a self-generating European miracle. **The Industrial Revolution appears instead as a late, regionally specific crystallization of a much longer, geographically dispersed process of knowledge production.** Europe's eventual dominance reflected not an intrinsic monopoly on rationality, but a historically contingent combination of access to extra-European knowledge, colonial resource frontiers, and new institutional forms.

2.4 Why are these matters for the wider argument

Dismantling the myth of spontaneous European innovation is not a cosmetic historiographical exercise; it is a necessary analytic step. If industrial modernity itself rests on inherited, globally produced knowledge, then contemporary structures of political and economic power—what you treat in ***The Political Empire***—must be understood as superstructures built atop that inherited foundation. Institutions such as international financial organizations, security alliances, standard-setting bodies, and platform monopolies did not emerge in a vacuum. They crystallized in a world where the West had already positioned itself as the central broker and gatekeeper of a knowledge system it did not originate.

The following sections of the paper, therefore, move from critique to reconstruction: mapping, in turn, the major extra-European **"knowledge reservoirs" (**India, Persia, China, the Islamic world), the mechanisms of colonial extraction and translation, and the continuity between those older patterns and contemporary forms of digital and data colonialism.

3. Ancient Civilizations as Knowledge Reservoirs

If Europe did not generate the core tools of modern science in isolation, where did they come from? This section maps four major "knowledge reservoirs"—India, the Islamic world (including Persia), China, and, to a lesser extent, Africa—and shows how each contributed indispensable components of what is now presented as "Western" science and technology.

The aim is not to romanticize any single region, but to establish a simple empirical point. **By the time Europe began to industrialize,**

much of the underlying intellectual infrastructure already existed elsewhere. Europe's distinctive role was to aggregate, systematize, and apply that knowledge within a new imperial and economic framework.

3.1 India: Number, Zero, and Trigonometry

The scientific foundations of industrial engineering rest on three pillars: a positional numeral system, algebraic manipulation, and trigonometric modelling. All three were developed to a high degree in South Asia long before they were stabilized in Europe.

Indian mathematicians introduced a fully positional base-10 numeral system, including a symbol for zero and a place-value convention that allowed efficient representation of arbitrarily large numbers.^1 As Kim Plofker and others have shown, Sanskrit mathematical texts from at least the first millennium CE display routine use of arithmetic operations—addition, subtraction, multiplication, division, extraction of roots—that would later underpin European algebra and calculus.^2 These numerals travelled westward through Persian and Arab intermediaries, becoming known in Europe as "Arabic numerals" despite their South Asian origin.^3

Indian astronomers and mathematicians also developed sophisticated trigonometric techniques. The so-called "sine function" has clear precursors in Indian jyā-tables, in which half-chords of a circle were tabulated for various angles.^4 Fifth-century Indian astronomers described, in finite-difference form, what is effectively the differential equation for the sine function—centuries before European mathematicians formalized trigonometric series.^5 Such tools were later crucial for celestial mechanics, navigation, and, eventually, engineering calculations central to industrial technology.

Indian metallurgy likewise contributed to the global knowledge pool. High-carbon crucible steels, collectively referred to as wootz, were produced in South Asia and exported widely across Eurasia. Their superior hardness and flexibility influenced weapon-making in the Middle East and Europe. ^6 While industrial steelmaking would later be mechanized and scaled in Britain, the underlying material knowledge was not exclusively European in origin.

3.2 The Islamic World and Persia: Algebra, Optics, and the Scientific Method

The Islamic world—stretching from Iberia through North Africa and the Middle East to Central Asia—served as a major relay zone, integrating Greek, Indian, and Persian traditions while generating novel contributions

of its own. George Saliba has documented how Islamic astronomers not only preserved Greek models but subjected them to rigorous mathematical critique, producing alternative planetary models and sophisticated trigonometric tools that would later inform European astronomy.^7 JSTOR

Algebra, a core language of modern science and engineering, emerged as a distinct discipline in this milieu. The very term derives from the title of al-Khwarizmi's ninth-century treatise *al-Jabr wa'l-Muqābala*, which systematically treated linear and quadratic equations. ^8 Through Latin translations, his work and those of his successors shaped European arithmetic, algebra, and the concept of algorithm itself (from al-Khwarizmi's name).

Advances in optics and experimental methods were similarly significant. ***Ibn al-Haytham's*** **Kitāb al-Manāẓir** ***(Book of Optics)*** combined experimental observation with geometric modelling to analyze reflection, refraction, and visual perception. ^9 Many historians regard this work as a key precursor to the experimental scientific method later celebrated in Europe. Latin translations of Ibn al-Haytham circulated from the twelfth century onwards and influenced figures such as Roger Bacon and Kepler.

Crucially, the Islamic world also developed institutional supports for scholarship—endowed madrasas, observatories, hospitals, and libraries—that facilitated cumulative research over centuries. ^10 When European scholars later translated Arabic and, indirectly, Sanskrit texts, they were tapping into an already mature scientific ecosystem rather than igniting a new one from scratch.

3.3 China: Engineering, Bureaucracy, and the State

China's contribution to the pre-industrial global knowledge system is both technological and organizational. Joseph Needham's *Science and Civilization in China* documents a long list of inventions—paper, printing, the compass, gunpowder, advanced ceramics, complex hydraulic engineering, and mechanical clocks—that predate or surpass their European equivalents.^11 Wikipedia

Chinese metallurgists developed blast-furnace technology capable of producing large quantities of cast iron centuries before comparable European processes emerged. ^12 Hydraulic engineering projects, such as large-scale irrigation systems and canal networks, displayed a sophisticated understanding of fluid dynamics in practice, if not in the abstract language of modern physics. Mechanical clockworks in Song-dynasty China featured gear trains and escapement mechanisms that would later appear only in Europe. ^13

Equally important is China's bureaucratic statecraft. The imperial examination system, based on meritocratic (if highly codified) selection, produced a professionalized administrative class capable of implementing large-scale public works and maintaining long-distance infrastructure.^14 This form of knowledge—***organizational, legal, logistical***—is often omitted from histories of science, but it is essential to understanding how complex technologies can be deployed across an empire.

Needham's "**Grand Question"** remains unresolved in fully satisfying terms: if China possessed such advanced technologies, why did it not experience an industrial revolution first? ^15 Kenneth Pomeranz suggests that ecological constraints and the absence of external colonies with exploitable resources limited China's ability to overcome land and energy bottlenecks. In contrast, Europe—especially Britain—escaped these constraints through coal and New World colonies.^16 Google Books The point for present purposes is narrower: **China was not "behind" Europe in scientific or technical capacity in 1500; it was differently configured.**

3.4 Africa and Other Overlooked Contributors

Compared with India, China, and the Islamic world, pre-modern Africa appears less frequently in global scientific histories, largely due to the relative scarcity of written sources and the violence of the slave trade and colonialism. Yet archaeological and metallurgical evidence points to independent development of iron smelting in sub-Saharan Africa, with techniques that differed from but equaled those of Eurasia in skill.^17 Agricultural knowledge—crop rotation suited to tropical climates, soil management, and botanical expertise—underpinned the plantation systems later established by Europeans in the Americas, even as enslaved Africans were denied recognition as knowledge bearers.^18

Other regions, including ***pre-Columbian Mesoamerica*** and the Andean world, developed sophisticated calendrical systems, agricultural terraces, and astronomical alignments. While the catastrophic population collapse following conquest limited their direct impact on European industrialization, they further illustrate that complex scientific and technical knowledge was not confined to any single "civilization".

3.5 Europe as Aggregator, Not Originator

By the time Britain began to industrialize, therefore, a vast archive of mathematical, astronomical, metallurgical, and organizational knowledge already existed outside Europe. Through trade, translation projects, missionary activity, and, increasingly, imperial conquest, European scholars and states gained access to these knowledge reservoirs. The ***Royal Society,***

Jesuit missions in China and India, and East India Company survey projects functioned as conduits through which non-European knowledge was collected, translated, and reframed as "Western science." ^19

Kenneth Pomeranz's account of the ***Great Divergence*** emphasizes that what distinguished Britain in the late eighteenth century was not an unprecedented intellectual breakthrough, but a peculiar combination of access to coal, colonial resource frontiers, and political institutions that allowed capital accumulation at scale.^20 JSTOR+1 When these material advantages were combined with imported mathematical and scientific tools, the conditions for industrialization were finally met.

From this perspective, the Industrial Revolution appears not as the spontaneous ignition of a uniquely European genius, but as the moment when a peripheral region successfully **aggregated, re-coded, and industrialized** a global knowledge system under the protection of an emerging imperial order. The following section will examine how this aggregation depended on deliberate mechanisms of intellectual extraction and translation—and how those mechanisms find a contemporary analogue in what has been described as "data colonialism" in the digital age.^21 Stanford University Press+1

4. Why the Industrial Revolution Could Not Occur Earlier

Suppose that the fundamental mathematical and technical components of industrialization existed in India, China, and the Islamic world centuries prior to their appearance in Europe. In that scenario, an additional inquiry arises: why did the Industrial Revolution not transpire earlier within those regions or during the medieval period in Europe? Addressing this question necessitates a distinction between knowledge conditions and material conditions. Possessing the conceptual tools for industrial technology is a prerequisite, yet not solely sufficient, for its emergence. According to Pomeranz's framework, what rendered north-western Europe—particularly Britain—distinctive by the late eighteenth century was not an unprecedented intellectual breakthrough, but rather a specific confluence of ecological, geographic, and imperial advantages that eliminated constraints on growth.

4.1 Knowledge Is Not Enough

By 1500, the world already contained:

- positional numerals and zero (India); ^2

- algebra and algorithmic method (Islamic world); ^3
- advanced metallurgy (China, India, parts of Africa); ^4
- complex hydraulic engineering (China, Middle East);^5
- sophisticated astronomical and trigonometric modelling (India, Persia, Islamic world). ^6

These are all prerequisites for industrial-scale engineering. Yet none of the regions that pioneered them leaped to coal-powered mechanization and factory production between 1000 and 1600.

Historians of technology and economic development point to several reasons. First, in agrarian empires, most surplus was absorbed by state projects, military expenditure, or elite consumption rather than systematically reinvested in capital-deepening machinery.^7 Second, where population growth pressed against land and ecological limits, technological advances were often used to stabilize existing systems rather than to transform them radically.^8 Third, in many cases, the social and legal institutions that might have underwritten large-scale private industrial investment either did not exist or served different ends.

In other words, **the existence of advanced knowledge did not by itself guarantee an Industrial Revolution**. It provided a toolkit that remained latent until a political-economic context emerged in which it could be combined with cheap energy, global extraction, and new forms of capital accumulation.

4.2 Britain's Late but Peculiar Conjuncture

Kenneth Pomeranz has argued that what finally tipped the balance in Britain's favor was a "fortunate conjuncture" of two factors: proximate, accessible coal deposits and external colonies that functioned as land- and resource-saving outlets.^9 Wikipedia+1

On the **energy side**, Britain sat atop substantial coal reserves near key industrial regions. As timber resources became strained, coal offered an abundant substitute that could power steam engines, metallurgical furnaces, and, later, railways and ships. ^10 In contrast, China's richest coal deposits were located far from its most developed coastal and riverine regions, increasing transport costs and complicating their integration into existing economic circuits. ^11

On the **ecological and resource side**, Britain and other European powers could externalize land and labor pressures to the New World.

Plantation agriculture in the Americas, supported by enslaved African labor, provided cheap cotton, sugar, timber, and other commodities. ^12 This effectively expanded Europe's usable land base and freed domestic labor for industrial employment. No comparable colonial frontier existed on the same scale for Asian empires.

These material asymmetries interact with the knowledge story in a specific way. Once Britain had:

1. **Access to imported mathematical and scientific tools** (from India, China, the Islamic world).

2. **increasingly reliable coal energy**; and

3. **colonial land and labor frontiers**,

It could deploy the global knowledge archive in a manner that no other polity could match.

4.3 Why Not Medieval or Early Modern Britain?

This framework also explains why Britain did *not* industrialize in the eleventh, twelfth, or fourteenth centuries, despite later claims about a continuous Western "spirit of progress".

In medieval Britain:

- The economy was overwhelmingly agrarian and feudal.

- Literacy rates were low, and mathematical knowledge was rudimentary.

- Roman numerals still dominated practical computation; ^13

- There was no sustained access to extra-European scientific traditions.

- No overseas colonies were supplying bulk raw materials.

- There was no institutionalized framework for industrial-scale capital markets.

Even in the sixteenth century, after the initial phases of maritime expansion, Britain lacked stable control over large colonies and was not yet the central node in global trade networks. The intellectual absorption of non-European science was partial and fragmentary; Jesuit reports from

China and India, for example, did not immediately translate into systematic industrial applications. ^14

Only by the late seventeenth and eighteenth centuries do we see the necessary pieces aligning:

- The consolidation of overseas empires.
- The growth of financial institutions (such as the Bank of England and stock exchanges) has enabled the mobilization of large capital pools.
- The spread of printed technical manuals and scientific societies.
- The maturation of coal mining and steam-engine technology.
- The existence of a domestic labor force that could be shifted from agriculture to industry. ^15

When these conditions were combined with the imported intellectual toolkit discussed in Sections 2 and 3, the result was a qualitatively new trajectory: sustained, compounding industrial growth.

4.4 The Civilizational Relay, Revisited

Seen from this perspective, the timing of the Industrial Revolution ceases to be mysterious. It appears at the point where three trajectories intersect:

1. **Long-running, geographically dispersed knowledge production** in India, China, the Islamic world, and elsewhere.
2. **European maritime and colonial expansion** linked these regions into an increasingly integrated yet highly unequal world system.
3. **A specific British ecological and financial configuration**, centered on coal and colonies, that enabled imported knowledge to be turned into an energy- and capital-intensive industry.

Europe—and Britain in particular—was thus not the birthplace of modernity in an absolute sense. It was the **terminal assembler** of a civilizational relay whose earlier stages unfolded elsewhere. What changed in the eighteenth century was not human intelligence, but the **structure of global contact**.

This matters directly for the argument developed in ***Independent Observer — Volume II: The Political Empire*****.** Suppose industrial modernity itself rests on a foundation of globally produced knowledge and

asymmetrically distributed material advantages. In that case, contemporary Western dominance in finance, law, security, and digital infrastructure must be understood as an **inheritance** of that earlier configuration, not as the natural outcome of a self-contained European essence.

The next section will therefore explicitly focus on the mechanisms of extraction and translation—colonial survey regimes, translation bureaus, missionary science—and their twenty-first-century counterparts in transnational data infrastructures and platform capitalism. ^16

5. Colonial Extraction and Translation Regimes: From Empire to Data Colonialism

The previous sections argued that Europe's industrialization depended on knowledge and resources originating elsewhere. This section examines the concrete mechanisms through which that dependency was operationalized. It then shows how structurally similar mechanisms reappear today in the guise of digital and data infrastructures.

In both cases, the pattern is the same: **infrastructures are built to pull value—first in the form of raw materials and codified knowledge, now in the form of data and computational labor—from peripheries to metropolitan centers.**

5.1 Knowledge as an Imperial Asset

From the seventeenth century onward, European imperial projects treated **knowledge itself**—about land, populations, resources, and local techniques—as a strategic asset. Colonial authorities deployed surveys, censuses, cartography, and ethnographic description to make distant territories **"legible"** to the metropole. ^1 These practices did not simply record reality; they transformed it into a form that could be administered, taxed, and reorganized.

In British India, for example, land revenue settlements were preceded by extensive mapping, soil classification, and documentation of agrarian practices.^2 The East India Company and, later, the British Crown relied on local intermediaries and indigenous knowledge to stabilize rule, even as they formalized authority in English legal and bureaucratic terms.^3 Colonial forestry and irrigation policies similarly incorporated, while subordinating local ecological expertise.^4

At the same time, colonial regimes extracted codified intellectual resources. Sanskrit, Arabic, and Persian manuscripts were collected, catalogued, and translated in institutions such as the Asiatic Society in Calcutta. Jesuit missions in China and India sent astronomical data, cartographic

information, and reports on local technologies back to Europe, where they were analyzed within emerging scientific networks. ^5 These flows of information allowed European scholars and policymakers to appropriate and reframe non-European knowledge as part of a supposedly universal, but effectively Eurocentric, science.

5.2 Translation, Re-labelling and Erasure

Translation played a central role in this process. When texts on mathematics, astronomy, or medicine moved from Sanskrit, Arabic, Chinese, or Persian into Latin, French, or English, they were rarely presented as contributions to a multi-centered global discourse. Instead, they were framed as raw material for European synthesis.

Gyan Prakash has shown how, in the Indian context, colonial administrators and European scientists recoded local knowledge—whether Ayurvedic medicine or artisanal practices—as either "traditional" (and therefore outdated) or as data input for modern science. ^6 The result was a hierarchy in which European institutions appeared as the final arbiters of validity.

This translated into rewriting the intellectual genealogy:

- Indian jyā-tables became "trigonometric tables" with their Indian origins obscured.
- Al-Khwarizmi's algebra and algorithms were naturalized within European mathematics.
- Ibn al-Haytham's optics became a prelude to Kepler and Newton, rather than a coequal intellectual achievement.
- Chinese mechanical inventions were represented as curiosities rather than central components of global technological history.

Such practices of re-labelling and erasure helped stabilize the myth, discussed in Section 2, that Europe was the natural home of rationality and science, thereby legitimizing political and economic domination.

5.3 Infrastructures of Extraction

Imperial knowledge regimes were closely tied to **physical infrastructures**—ports, railways, telegraph lines, and steamship routes—those channeled resources from colonies to metropoles. Railways in India, for instance, were built less to integrate local economies for their own sake than to move soldiers, cotton, grain, and minerals efficiently toward ports

serving British industrial and military needs. ^7 Telegraph cables knitted colonies into real-time communication networks whose center of gravity lay in London and other European capitals.

The pattern is recognizable: **infrastructure is laid out from the core outward, but value flows inward.** The legitimacy of these projects was often framed in universalist terms— "development", "civilization", "progress"—but the asymmetry of control, ownership, and benefit was clear.

5.4 The Digital Turn: Data as the New Raw Material

In the twenty-first century, scholars such as Nick Choudry and Ulises Mejias argue that a structurally similar logic underpins what they term **"data colonialism"**.^8 In their view, the large-scale extraction of data from human life—behavioral traces, social interactions, location, biometrics—constitutes a new phase in the long history of colonial appropriation. The resource is no longer land, silver, or cotton, but quantifiable information about people and environments. LSE Research Online+1

This extraction is enabled by **digital infrastructure**: undersea cables, data centers, cloud platforms, and mobile networks. These infrastructures connect billions of users in the Global South to platforms whose legal and financial centers are in North America and Western Europe. As Choudry and Mejias stress, the rhetoric is again one of connectivity and inclusion, while ownership and ultimate control remain highly concentrated.^9 Stanford University Press+1

Meta's 2Africa subsea cable system is one example. Launched in 2020 and nearing completion by late 2025, 2Africa forms a 45,000-kilometre loop connecting 33 countries across Africa, Europe, and Asia, with landing points from the UK to South Africa, Djibouti, and the Gulf.^10 Meta presents the project as an effort to "connect communities" and "accelerate economic growth", but critical reporting has noted the strategic importance of securing a privileged position in the data pipelines of a continent with a rapidly growing, mobile-first user base.^11 The Dial+3Engineering at Meta+3RCR Wireless News+3

A similar story is emerging between the United States and India. In 2025, Meta announced "**Project Waterworth",** promoted as the world's most extensive subsea cable network, designed to connect the US, India, Brazil, South Africa, and other regions with a 50,000-kilometre, high-capacity system to support AI workloads and India's digital economy.^12 The Guardian India already functions as a central hub for software development, data labelling, and IT services; deepening physical

connectivity locks in its role as a **data and computation supplier** to platforms and corporations headquartered elsewhere.

These projects echo the colonial-era pattern: **infrastructure radiates outwards, yet the decisive capabilities—cloud ownership, algorithm design, capital accumulation—are concentrated in the metropole.** As a recent critical study of data flows in Africa notes, platforms such as Google and Meta collect vast amounts of user data from the Global South, train algorithms and build AI products with that data, while storing it in data centers outside the region and returning little in the way of fiscal or governance control.^13 arXiv+1

5.5 Colonialism's "Plan B."

Choudry and Mejias characterize data colonialism as ***"colonialism's Plan B":*** a mode of appropriation that extends the logic of older colonial regimes into new domains where the resource is not territory but experience itself.^14 In public interviews, they explicitly link the enclosure of English commons that enabled the first Industrial Revolution to the contemporary enclosure of digital spaces through platforms and proprietary standards.^15 policyreview.info+1

Recent work by Toussaint Nothias traces an intellectual history of ***"digital colonialism",*** showing how activists and scholars from the Global South have used the term to describe the concentration of digital power and the asymmetry of who sets the rules of online life.^16 OUP Academic Just as colonial administrators once defined categories, borders, and property regimes in their own image, today platform companies write terms of service, content policies, and algorithmic ranking systems that shape the social realities of billions.

From the vantage point developed in this paper, these developments are not an aberration but a continuation. The **civilizational relay** described earlier—whereby Europe industrialized by aggregating external knowledge under unequal conditions—is now mirrored in a digital relay, in which Western-centered platforms aggregate data and computational labor from a globally dispersed user base.

5.6 Bridge to Volume II: Inheritance Over the Political Empire

This structural continuity is central to the argument of *Independent Observer — Volume II: The Political Empire*. The claim is not that nothing has changed since the nineteenth century, but that **the basic architecture of extraction and control has adapted rather than disappeared**.

Where empires once ruled via chartered companies, gunboat diplomacy, and colonial administration, today's global order is governed through:

- Financial infrastructures (reserve currencies, SWIFT, sovereign debt markets).
- Legal infrastructures (investment treaties, IP regimes, arbitration forums).
- Security infrastructures (alliances, bases, surveillance networks).
- Digital infrastructures (platforms, cables, data centers, cloud governance).

In each domain, the West occupies the institutional high ground, inheriting and reconfiguring advantages accumulated during the age of territorial empire. The industrialized North presents itself as the natural center of innovation and governance, even though, as this paper has argued, both its original industrial ascent and its contemporary digital dominance are deeply dependent on knowledge, labor, and data from elsewhere.

Understanding this **inheritance over the political empire** requires seeing industrialization itself not as a self-generated European achievement, but as the outcome of a long civilizational relay. Only then can we properly situate today's debates over AI, platform power, and global governance within the much older history of how some societies have systematically turned other people's knowledge and experience into their own power.

6. Conclusion — Stolen Fire and the Inheritance of Empire

This paper began from a deceptively simple observation: **Homo sapiens has been around for roughly 200,000 years, yet what we call "modernity" is only a few centuries old.** The Industrial Revolutions, often presented as a spontaneous European miracle, appear late and abruptly in the historical record. The conventional explanation—European exceptionalism—does not withstand scrutiny.

The preceding sections have contended that, by the time Britain underwent industrialization, **the fundamental intellectual infrastructure for industrial technology was already established outside Europe**. Key developments such as positional numerals and zero, algebra, algorithmic thinking, trigonometric modelling, advanced metallurgy, complex hydraulic engineering, and bureaucratic statecraft evolved over centuries in regions including India, China, the Islamic world,

and parts of Africa.^1 Europe's distinctive contribution was not to invent these elements ex nihilo but to **aggregate, re-encode, and industrialize** them within a novel political–economic framework facilitated by colonial expansion.^2

The **"civilizational relay"** model proposed here reframes the Industrial Revolution as the intersection of three trajectories:

1. Long-term, geographically dispersed knowledge production across Asia, the Middle East, and Africa.

2. European maritime and imperial expansion linked these knowledge reservoirs into an unequal global system.

3. A specific British conjuncture of coal, colonies, and financial institutions that enabled imported knowledge to be translated into energy-intensive, capital-intensive industrial production. ^3

From this standpoint, it is no longer puzzling that Britain did not industrialize in the eleventh or fourteenth centuries. Medieval Britain lacked the imported intellectual tools, the ecological and resource buffers, and the institutional mechanisms of capital mobilization that later underpinned industrialization. Nor is it surprising that regions which pioneered key scientific advances did not industrialize first: **knowledge alone was insufficient without a global structure that allowed one region to externalize ecological limits and appropriate other people's labor and resources.**

The paper then traced how this pattern of extraction was operationalized through **colonial knowledge regimes**—surveys, censuses, translation projects, and scientific societies—that turned local expertise and textual traditions into imperial assets. These regimes were embedded in physical infrastructures—railways, ports, telegraph, and steamship routes—designed to move value from periphery to core.

Finally, the analysis extended this logic into the twenty-first century. Contemporary forms of **data colonialism** replicate, in a new domain, the same structural asymmetry: undersea cables, cloud infrastructures, and platform ecosystems connect billions of users in the Global South to systems whose legal and financial command centers lie in the Global North.^4 Platforms extract data and computational labor at scale, train AI models, and monetize digital behavior. At the same time, infrastructural ownership, standard-setting power, and regulatory leverage remain concentrated in a handful of Western corporations and states. ^5

The analogy is not metaphorical but structural. Just as the first Industrial Revolution depended on coal, cotton, and stolen scientific fire from the East, the emerging AI-platform order depends on **global data streams and code work** sourced disproportionately from the same broad geographies. The direction of extraction has not changed; only the medium has.

For the wider *Independent Observer* project, this conclusion performs two functions.

First, it **destroys the intellectual alibi** that underwrites much of contemporary Western political legitimacy—the story that Europe (and later the United States) rose purely through internal genius, hard work and a unique cultural affinity for reason. Once the historical record is restored, it becomes clear that what is now called "the West" sits atop a layered inheritance of other people's mathematics, astronomy, metallurgy, administrative techniques, land, labour and, today, data.

Second, it **prepares the ground for Volume II: The Inheritance Over the Political Empire**. Suppose industrial modernity itself is a product of civilizational relay under conditions of asymmetrical power. In that case, the institutional architecture that governs the present—international financial organizations, reserve-currency systems, security alliances, intellectual property regimes, platform monopolies and standards bodies—must be read not as neutral, technocratic structures, but as the **political superstructure built over that inherited foundation.**

The core claim that follows into Volume II is therefore straightforward:

The same societies that assembled and industrialized a global knowledge system under empire now dominate the institutions that define what counts as lawful, secure, "developed", creditworthy, and even visible in the digital sphere.

The question is no longer whether Europe or "the West" was uniquely creative. It is whether the **inheritance of that earlier asymmetric order** can be contested, renegotiated, or rebalanced in a world where the demographic, intellectual, and data-generating centers of gravity are shifting once again toward the East and the Global South.

The Industrial Revolution, in this light, was not the birth of Western civilization, but a moment when **stolen fire was wired into coal, factories, and law.** The present digital order is simply the latest grid built on that same blaze.

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